

WHAT IS CLAIMED IS:

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1. An optical write apparatus comprising:
a plurality of substrates each having a large
number of light emitting diodes aligned in one direction,
the plurality of substrates being shifted from each
10 other in the aligning direction of the light emitting
diodes,

wherein two substrates adjacent to each other
in the aligning direction of the light emitting diodes
are fixed to each other.

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2. An optical write apparatus comprising:
20 a plurality of substrates each having a large
number of light emitting diodes aligned in one direction,
the plurality of substrates being shifted from each
other in the aligning direction of the light emitting
diodes; and

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auxiliary members interposed between the

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substrate adjacent in the aligning direction of the
light emitting diodes,

wherein fixed points between the auxiliary
members and the substrates are aligned in a line that is
5 perpendicular to the aligning direction of the light
emitting diodes.

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3. The optical write apparatus as claimed in
claim 2, wherein the auxiliary members, together with
the substrates, constitute a plurality of light emitting
diode array units, and include holding members for
15 holding the substrates and a connecting member for
connecting the substrates.

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4. The optical write apparatus as claimed in
claim 3, wherein:

the plurality of light emitting diode array
units are shifted from each other in the aligning
25 direction of the light emitting diodes, the adjacent

light emitting diode array units being connected via the connecting member; and

fixed points for fixing the substrate of one of the adjacent light emitting diode array units to the corresponding holding member and for fixing the holding member to the connecting member, and fixed points for fixing the substrate of the other one of the adjacent light emitting diode array units to the corresponding holding member and for fixing the holding member to the connecting member are aligned in a line that is perpendicular to the aligning direction of the light emitting diodes.

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5. The optical write apparatus as claimed in claim 4, comprising three or more light emitting diode array units, wherein:

both ends of a center light emitting diode array unit of any three adjacent light emitting diode array units are fixed to the two end light emitting diode array units in the aligning direction of the light emitting diodes;

the fixed points for fixing the substrate to

the holding member and for fixing the holding member to the connecting member in the center light emitting diode array unit and one of the two end light emitting diode array units are aligned in a line that is perpendicular to the aligning direction of the light emitting diodes; and

the fixed points in the center light emitting diode array unit and the other one of the two end light emitting diode array units are also aligned in a line that is perpendicular to the aligning direction of the light emitting diodes.

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6. The optical write apparatus as claimed in claim 3, wherein:

a part of each of the substrates protrudes from each corresponding holding member;

the protruding part of each of the substrates is fixed to the protruding part of the adjacent substrate; and

the fixed points between the connecting member and the holding members are replaced by fixed points for fixing the protruding parts of the adjacent substrates

to each other.

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7. The optical write apparatus as claimed in claim 1, wherein

one or more fixed points between the substrates adjacent to each other in the aligning direction of the light emitting diodes correspond to write dot switching points on the substrates.

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8. The optical write apparatus as claimed in claim 1, further comprising an array position adjusting unit that adjusts relative positions of the substrates adjacent to each other in the aligning direction of the light emitting diodes.

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9. The optical write apparatus as claimed in

claim 8, wherein:

the array position adjusting unit connects a pair of connecting members adjacent to each other in the aligning direction of the light emitting diodes via an
5 adjusting screw;

one of the pair of connecting members is fixed to one of the adjacent substrate and the adjacent light emitting diode array unit; and

the other one of the pair of connecting
10 members is fixed to the other one of the adjacent substrate and the adjacent light emitting diode array unit.

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10. The optical write apparatus as claimed in claim 1, further comprising a focusing unit that displaces a first substrate of two adjacent substrates
20 with respect to a second substrate of the two adjacent substrates in a focusing direction that is equivalent to a thickness direction of the second substrate.

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11. The optical write apparatus as claimed in claim 10, wherein

the focusing unit comprises:

a plate-like connecting member respectively
5 fixed to the two adjacent substrates;

an adjusting plate that faces the connecting member, and is fixed to the connecting member on the side of the second substrate and to a fixed member; and

a first external force unit that supplies an
10 external force to the connecting member by varying a gap between the connecting member and the adjusting plate on the side of the first substrate, and

the external force supplied by the first external force unit deforms and displaces with respect
15 to a fixed point between the connecting member and the adjusting plate, so that the second substrate is moved with respect to the first substrate in the focusing direction to focus the light emitted from the light emitting diodes aligned on the second substrate.

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12. The optical write apparatus as claimed in
25 claim 10, wherein a point where the external force is

supplied by the first external force unit on the connecting member is located at a position that faces the second substrate.

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13. The optical write apparatus as claimed in claim 10, wherein the focusing unit is disposed at each of left and right ends of a light emitting diode array unit, with a line passing through the center point between the first substrate and the second substrate being a symmetrical axis.

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14. The optical write apparatus as claimed in claim 1, further comprising a vertical direction adjusting unit that moves one of the two substrates adjacent to each other in the aligning direction of the light emitting diodes with respect to the other one of the two adjacent substrates, so that light emitted from the light emitting diodes on the moved substrate is adjusted in a vertical direction in which the light

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a supporting member that is in contact with the connecting member and the adjusting plate at a midpoint between the fixed position and the second external force unit.

16. The optical write apparatus as claimed in claim 14, wherein the vertical direction adjusting unit is disposed at each of left and right ends of the other one of the two adjacent substrates, with a line passing
5 through the center point between the two adjacent substrates being a symmetrical axis.

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17. The optical write apparatus as claimed in claim 1, further comprising:

a focusing unit that displaces one of the two substrates, which are adjacent to each other in the
15 aligning direction of the light emitting diodes, in the thickness direction of the displaced one of the two adjacent substrates; and

a vertical direction adjusting unit that moves the one of the two adjacent substrates so as to adjust
20 light emitted from the moved substrate in a vertical direction in which the light emitted from the moved substrate moves toward and away from light emitted from the other one of the two adjacent substrates.

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18. The optical write apparatus as claimed in claim 17, wherein:

the focusing adjusting unit comprises a plate-like connecting member fixed to the two substrates adjacent to each other in the aligning direction of the light emitting diodes, an adjusting plate fixed to a fixed member and the connecting member at a fixed position on the side of the displaced and moved substrate, and a third external force unit that narrows and widens a gap between the connecting member and the adjusting plate on the side of the other one of the two adjacent substrates; and

the vertical direction adjusting unit comprises a fourth external force unit that narrows and widens the gap between the connecting member and the adjusting plate by applying an external force to the end portion of the connecting member on the side of the other one of the two adjacent substrates, with a part of the third external force unit being a supporting point.

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19. The optical write apparatus as claimed in claim 17, wherein

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the focusing unit and the vertical direction
adjusting unit are disposed on each of left and right
ends of a light emitting diode array unit, with a line
passing through the center point between the two
5 adjacent substrates being a symmetrical axis.

10 20. The optical write apparatus as claimed in
claim 10, wherein:

the auxiliary member is movably attached to
the substrates;

the focusing unit, the vertical direction
15 adjusting unit, the substrates, and the auxiliary member
constitute an integrated structure; and

one of the components of the integrated
structure is fixed as a third adjusting plate to common
supporting member employed as the fixed member.

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21. The optical write apparatus as claimed in
25 claim 20, wherein

the substrates and the auxiliary member are fixed to the common supporting member by an auxiliary supporting unit at a given location on the alignment of the light emitting diodes.

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22. The optical write apparatus as claimed in
10 claim 21, wherein

the auxiliary supporting unit supports the substrates and the auxiliary member, so that the substrates and the auxiliary member are movable in the aligning direction of the light emitting diodes, and
15 that the positions of the substrates and the auxiliary member can be adjusted in the vertical direction and the focusing direction.

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23. The optical write apparatus as claimed in claim 20, wherein

the common supporting member includes
25 attachment units that attach the common supporting

member to an attaching member and adjusts the common supporting member in the focusing direction, the attachment units disposed on either end thereof in the aligning direction of the light emitting diodes.

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24. The optical write apparatus as claimed in claim 11, wherein

the first external unit is constituted by a screw unit disposed between the connecting member and the adjusting plate.

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25. An optical write apparatus comprising:
a plurality of light emitting diode array units arranged in a horizontal direction of a photosensitive member, each of the plurality of light emitting diode array units emitting light from light emitting diodes onto the photosensitive member to form a latent image thereon; and

25 a light emission amount correction unit that

corrects the amount of light emitted from a light
emitting diode located at a seam portion between
adjacent light emitting diode array units so that the
amount of exposure light in the horizontal direction of
5 the photosensitive member becomes uniform.

10 26. The optical write apparatus as claimed in
claim 25, wherein

the light emission amount correction unit
performs light emission amount correction by adjusting
the amount of light emitted from at least a light
15 emitting diode located at the end of one of the adjacent
light emitting diode array units connected at the seam
portion.

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27. The optical write apparatus as claimed in
claim 26, wherein

the light emission amount correction unit
25 comprises a mechanism that increases the amount of light

emitted from at least the light emitting diode located
at the end of one of the adjacent light emitting diode
array units, when a write range of one of the adjacent
light emitting diode array units connected at the seam
5 portion is separated from a write range of the other one
of the adjacent light emitting diode array units in the
horizontal direction, and an actual gap between the
centers of dots of light emitted from light emitting
diodes corresponding to the end of the write ranges on
10 the side of the seam portion is larger than a reference
gap between the centers of dots of light emitted from
two adjacent light emitting diodes of the light emitting
diode array units.

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28. The optical write apparatus as claimed in
claim 26, wherein

20 the light emission amount correction unit
comprises a mechanism that decreases the amount of light
emitted from at least the light emitting diode located
at the end of one of the adjacent light emitting diode
array units, when a write range of one of the adjacent
25 light emitting diode array units connected at the seam

portion is separated from a write range of the other one of the adjacent light emitting diode array units in the horizontal direction, and an actual gap between the centers of dots of light emitted from light emitting diodes corresponding to the end of the write ranges on the side of the seam portion is smaller than a reference gap between the centers of dots of light emitted from two adjacent light emitting diodes of the light emitting diode array units.

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29. An optical write apparatus comprising:

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a plurality of light emitting diode array units arranged in a horizontal direction of a photosensitive member, the plurality of light emitting diode array units each emitting light from light emitting diodes onto the photosensitive member to form a latent image thereon; and

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a write range shift unit that shifts a write range, in the horizontal direction, of at least one of adjacent light emitting diode array units connected at a seam portion therebetween.

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30. The optical write apparatus as claimed in claim 29, wherein

when the write range of one of the adjacent light emitting diode array units connected at the seam portion is separated from a write range of the other one of the adjacent light emitting diode array units in the horizontal direction, and an actual gap between the centers of dots of light emitted from light emitting diodes corresponding to end portions of the respective write ranges on the side of the seam portion is larger than twice a reference gap between the centers of dots of light emitted from any two adjacent light emitting diodes of the light emitting diode array units,

the write range shift unit shifts the write range of at least one of the adjacent light emitting diode array units, so that the write ranges of the adjacent light emitting diode array units are separated from each other in the horizontal direction, and that the actual gap becomes smaller than twice the reference gap.

31. The optical write apparatus as claimed in

claim 29, wherein

when the write range of one of the adjacent
light emitting diode array units connected at the seam
portion overlaps with a write range of the other one of
5 the adjacent light emitting diode array units in the
horizontal direction,

the write range shift unit shifts the write
range of at least one of the adjacent light emitting
diode array units, so that the write ranges of the
10 adjacent light emitting diode array units are separated
from each other, and that the actual gap becomes smaller
than twice the reference gap.

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32. The optical write apparatus as claimed in
claim 25, wherein:

the light emission amount correction unit
20 adjusts the amount of light emitted from a light
emitting diode located at the end of at least one of the
adjacent light emitting diode array units connected at
the seam portion; and

the optical write apparatus further comprising
25 a write range shift unit that shifts, in the horizontal

direction, a write range of at least one of the adjacent light emitting diode array units connected at the seam portion.

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33. The optical write apparatus as claimed in claim 32, wherein:

10 when the write range of one of the adjacent light emitting diode array units connected at the seam portion is separated from the write range of the other one of the adjacent light emitting diode array units in the horizontal direction, an actual gap between the
15 centers of dots of light emitted from light emitting diodes corresponding to the write ranges on the side of the seam portion is larger than a reference gap between the centers of dots of light emitted from any two adjacent light emitting diodes of the light emitting
20 diode array units, or the write ranges overlap with each other in the horizontal direction,

 the write range shift unit shifts the write range of at least one of the adjacent light emitting diode array units, so that the write ranges are
25 separated from each other in the horizontal direction,

and that the actual gap becomes equal to or smaller than the reference gap; and

when the actual gap is smaller than the reference gap,

5 the light emission amount correction unit reduces the amount of light emitted from the light emitting diode corresponding to the end of the write range of at least one of the adjacent light emitting array units.

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34. The optical write apparatus as claimed in
15 claim 32, wherein:

when the write range of one of the adjacent light emitting diode array units connected at the seam portion overlaps with the write range of the other one of the adjacent light emitting diode array units in the
20 horizontal direction, an actual gap between the centers of dots of light emitted from light emitting diodes corresponding to the ends of the write ranges on the side of the seam portion is equal to or larger than
25 twice a reference gap between the centers of dots of light emitted from any two adjacent light emitting

diodes of the light emitting diode array units, or the actual gap is smaller than the reference gap,

the write range shift unit shifts the write range of at least one of the adjacent light emitting diode array units, so that the actual gap becomes equal to or larger than the reference gap and smaller than twice the reference gap; and

when the actual gap is larger than the reference gap,

the light emission amount correction unit increases the amount of light emitted from the light emitting diode located at the end of at least one of the adjacent light emitting diode array units connected at the seam portion.

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35. The optical write apparatus as claimed in claim 32, wherein:

when the write range of one of the adjacent light emitting diode array units connected at the seam portion overlaps with the write range of the other one of the adjacent light emitting diode array units in the horizontal direction, or an actual gap between the

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centers of dots of light emitted from light emitting diodes corresponding to the ends of the write ranges on the side of the seam portion is equal to or larger than twice a reference gap between the centers of dots of light emitted from any two adjacent light emitting diodes of the light emitting diode array units,

the write range shift unit shifts the write range of at least one of the adjacent light emitting diode array units, so that the write ranges are separated from each other in the horizontal direction, and that the actual gap becomes smaller than twice the reference gap;

when the actual gap is smaller than the reference gap,

the light emission amount correction unit reduces the amount of light emitted from the light emitting diode located at the end of the write range of at least one of the adjacent light emitting diode array units connected at the seam portion; and

when the actual gap is larger than the reference gap,

the light emission amount correction unit increases the amount of light emitted from the light emitting diode located at the end of at least one of the adjacent light emitting diode array units connected at

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the light emission amount correction unit
corrects light emitting power of the light emitting
10 diodes so as to adjust the amount of emitted light.

the light emission amount correction unit corrects light emitting time of the light emitting diodes so as to adjust the amount of emitted light.

38. An image forming apparatus comprising:
a photosensitive member that is uniformly

charged; and

an optical write apparatus that irradiates the photosensitive member so as to form a latent image to be turned into a visible image,

5 wherein:

the optical write apparatus comprises a plurality of substrates each having a great number of light emitting diodes aligned in one direction, the plurality of substrates being shifted from one another
10 in the aligning direction of the light emitting diodes, and, among the plurality of substrates, every two substrates adjacent to each other in the aligning direction of the light emitting diode being fixed to each other.

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39. An image forming apparatus comprising:

20 a photosensitive member that is uniformly charged; and

an optical write apparatus that irradiates the photosensitive member so as to form a latent image to be turned into a visible image,

25 wherein:

the optical write apparatus comprises:

a plurality of light emitting diode array units in a horizontal direction of the photosensitive member, and irradiates the photosensitive member with

5 light emitted from light emitting diodes aligned on each of the light emitting diode array units so as to form a latent image; and

a light emission amount correction unit that corrects the amount of light emitted from the light
10 emitting diodes located at each seam portion between the light emitting diode array units, so that the photosensitive member is uniformly exposed at each seam portion between the light emitting diode array units.

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40. A method of positioning an optical write apparatus to be attached to an image forming apparatus,
20 the optical write apparatus comprising a plurality of substrates each having a great number of light emitting diodes aligned in one direction, the substrates being shifted from one another in a horizontal direction,

the method comprising the steps of:

25 displacing the optical write apparatus from an

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image forming apparatus, so that one of two substrates adjacent to each other in the horizontal direction is positioned in a focusing direction that corresponds to the thickness direction of the substrate; and

5 displacing the other one of the adjacent substrates from the optical write apparatus, so that the other one of the adjacent substrates is positioned in the focusing direction that corresponds to the thickness direction of the substrate.

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41. The method as claimed in claim 40,
15 further including the step of
 after positioning the other one of the adjacent substrates in the focusing direction, moving the other one of the adjacent substrates while steadying the one of the adjacent substrates, so that light
20 emitted from the light emitting diodes on the other one of the adjacent substrates moves in a vertical direction toward or away from light emitted from the light emitting diodes on the one of the adjacent substrates.

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42. A method of adjusting a light emitting state of an optical write apparatus that adjusts the light emitting state of light emitting diodes located at each seam portion between light emitting diode array units so as to even the amount of exposure light applied to a photosensitive member at each seam portion when forming a latent image by exposing the photosensitive member with the light emitted from the light emitting diodes aligned on each of the light emitting diode array units arranged in a horizontal direction of the photosensitive member,

the method comprising the steps of:

when there is a difference between a reference gap between the light emitting diodes and an actual gap between the light emitting diodes located at the ends of write ranges of the light emitting diodes array units connected at the seam portion, shifting the write range of at least one of light emitting diode array units connected at the seam portion by the light emitting diode, thereby narrowing the difference; and

when there is a remaining difference, adjusting the amount of light emitted from the light emitting diode located at the end of at least one of the light emitting diode array units connected at the seam portion, so as to eliminate unevenness of the amount of

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wherein

the amount of light emitted from the light emitting diode located at the end of at least one of the light emitting diode array units connected at the seam portion is reduced so as to eliminate the unevenness of the amount of exposure light caused by the remaining difference.

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